

Damage to the Inferior Alveolar Nerve During Tooth Extraction

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Abstract: This article focuses on inferior alveolar nerve injury during tooth extraction. The study was conducted from September 2021 to September 2023. Forty five patients were included in the study and divided into three groups. Group I (test group) consisted of 15 patients who underwent coronectomy. Group II (test group) consisted of 15 patients who underwent complete tooth extraction with prior orthoextrusion. Group III (control group) consisted of patients who underwent complete extraction of the third lower molar. Based on the analysis, coronectomy and two-stage extraction with orthoextrusion of intact third lower molars with close root location to the mandibular canal allows avoiding not only intraoperative but also postoperative complications.

Keywords: orthoextrusion, coronectomy, third molars, inferior alveolar nerve, nerve injury.

Introduction. Lower third molar surgery is one of the most common procedures in oral and maxillofacial surgery and ranges from 34.9% to 58.7% [1,5]. Prophylactic removal or preservation of vertically positioned lower third molars is a controversial issue and should be decided on a case-by-case basis[4,7]. However, removal of retained and distaposed mandibular third molars is unquestionably indicated when there are risks of inflammatory diseases of the surrounding soft tissues and carious damage to the distal surface of the second molar[5,8]. Removal of mandibular third molars in complex anatomical conditions may lead to complications such as paresthesia due to the close proximity of the roots to the NAS. The choice of extraction method in complex anatomical conditions is always a dilemma for the surgeon[3,6].

In different clinical studies, the probability of post-extraction injury to the inferior alveolar nerve varies from 0.35% to 19% depending on the location of the third lower molar and the chosen extraction technique. The importance of adequate visualisation of anatomical structures at the treatment planning stage in dentistry is due to the unpredictable clinical outcome of dental interventions [2,10]. During surgery for the removal of third molars, a bilateral anatomical structure may be damaged, namely the mandibular canal with a neurovascular bundle consisting of the inferior alveolar nerve, the artery and vein of the same name. The canal has its physiological origin from the mandibular foramen, which is located on the inner surface of the mandibular branch and ends on the outer surface of the body with the chin opening in the area of the roots of the premolars. According to K. A. Egorov, S. V. Grishin, and K. A. Korotkov (2007), the course of the mandibular canal is

described as a descending line, and in the body of the mandible as a sinusoid, which in the area of the roots of the molars makes a bend with a downward bulge. Therefore, correct visualisation of the canal inside the mandible at the stage of planning and clinical decision-making regarding the surgical treatment of third molars makes it possible to avoid one of the complications - perforation of the mandibular canal wall with damage to all elements of the neurovascular bundle [3, 4]. Currently, in our Republic, planned surgical interventions (complete extraction) are used for the extraction of mandibular third molars, with the help of which a high percentage of cure rate is achieved. The choice of the method of extraction of lower third molars depends on the location in the jaw, proximity to important anatomical formations.

PURPOSE: To compare the results of coronectomy, complete two-stage third molar extraction with preliminary orthoextrusion and complete lower third molar extraction using the conventional method.

MATERIALS AND METHODS: The randomised controlled trial was conducted from September 2021 to September 2023.

Forty five patients were included in the study and divided into three groups.

Group I (test group) consisted of 15 patients who underwent coronectomy.

Group II (test group) consisted of 15 patients who underwent complete tooth extraction with prior orthoextrusion.

Group III (control group) consisted of patients who underwent complete extraction of the third lower molar.

A total number of 45 patients were included in the study, with 15 patients in each group. The mean age was 24.9 ± 3.933 years. Among the study participants, 48.8% (22) were males and 51.11% (23) were females.

Inclusion criteria:

- Patients who had mandibular third molars close to the NAS as assessed radiologically using cone beam computed tomography.
- All patients were in the age group of 18 to 40 years and in good general health.
- Patients with a vital tooth without signs of carious and periapical changes.
- Patients with recurrent pericoronitis.
- Patients with vertically, mesially or distally inclined mandibular third molars.

Exclusion criteria:

- Patients allergic to any of the local anaesthetic solutions and/or allergic to the drugs prescribed in the study.
- Presence of acute infection or oedema in the area of the tooth to be extracted.
- Patients with chronic diseases in the stage of exacerbation.
- Patients with mobile teeth.

All patients underwent a complete medical and dental examination, including collection of anamnesis, epidanamnesis and allergic reactions to drugs. Preoperative investigations included general blood tests, cone beam computed tomography.

Patients were given detailed explanations of all parameters and possible complications of the study. Each patient included in the study gave informed consent which was signed in the presence of independent witnesses.

In all patient groups, surgery was performed using local conduction and infiltration anaesthesia. For blockade of mandibular, cheek and lingual nerves, a solution of articaine with adrenaline in the proportion of 1:200,000 was used.

All patients in the study systematically received a postoperative portion of ibuprofen in the form of oral tablets with a dose of 400 mg taken for pain, antibiotic therapy was not given in any group.

In cases where the mandibular third molars are close to the inferior alveolar canal at coronectomy, preservation of the vital upper third of the tooth root will be performed in Group I patients. After removal of the crown portion of the mandibular third molar, alignment of the remaining root fragments was performed using a fissure bur so that the remaining roots would be at least 3 mm below the crest of the lingual and cheek plates at all points, in case of coronectomy. In group II of patients the third molars of the mandible were completely extracted using a two-stage method after orthoextrusion, where in the first stage an orthodontic screw was placed distal to the extracted tooth and the tooth was pulled and detached from the NAS. In group III patients, the impacted mandibular third molars were completely extracted using Moore and Gilbe collar method.

The parameters studied in this study included assessment of pain, oedema, nerve paresthesia, trismus, postoperative infection, postoperative wound discrepancy, depth of postoperative pocket and apical root migration after coronectomy. All these parameters were evaluated at the following time points: 3 days after surgery, 7 days after surgery, 3 and 6 months after surgery.



Fig.1 Axial section of tooth 3.8

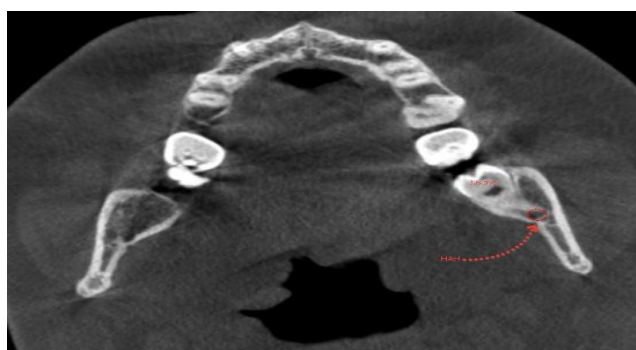


Fig.2 Sagittal section of tooth 3.8

In group I patients under local infiltration anaesthesia Sol.Articaini 1:100000 - 1.5ml, an incision was made in a typical place, the mucosal-adcostal flap was removed. Skeletonisation of the compact lamina of the area was performed, the crown part of the mandibular third molars was visualised. Using

a ball-shaped diamond bur, bone tissue reduction was performed in the area of distal cusps, if any, and resection of the crown part to dentin.

In group II patients under local infiltration anaesthesia Sol.Articaini 1:100000 - 1.5ml in the retromolar area on the right side, a typical incision was made, the mucosal-adjacent flap was removed. Skeletonisation of the compact lamina of the area was performed, the crown part of the third molar was visualised. Using a ball-shaped diamond bur, the bone tissue behind the distal cusps of the teeth was reduced, thereby creating a bone pocket where the tooth would later be advanced (Fig. 3)



Fig.3 The first stage of the operation

A mini-screw was fixed into the compact plate in the retromolar region. An orthodontic button was fixed on the mesial-cheek tubercle of the lower third molars according to the adhesive protocol and activated with "Ultra-chain 15 FT" orthodontic rubbers. The wound was sutured with knotted sutures. Recommendations were given and a second stage of surgery was scheduled in 30 days. CBCT on the 30th day after the first stage of the operation showed no destructive changes in the bone tissue, there was a medial and upward migration of the teeth. Detachment of the root of the teeth from the NAS was noted (Fig. 4).

The second stage on the 30th day under local anaesthesia Sol.Articaini 1:100000 - 1.5ml in the retromolar region on the right side was performed with a typical incision, mucosal-adjacent flap was removed, mini-screw and orthodontic traction were removed. Extraction of the 3.8 tooth with a luxator was performed. Blood was taken from the patient's vein, PRF (platelet-rich plasma) was made and placed on the dental cavity. The wound was sutured with knotted sutures using polyamide thread 6.0.

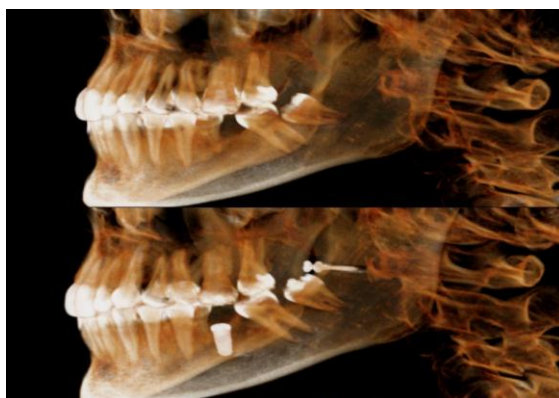


Fig. 4 Migration of a 3.8 tooth in dynamics

Conclusions. Thus, based on the analysis, coronectomy and two-stage extraction with orthoextrusion of intact third lower molars with roots close to the mandibular canal allows us to avoid not only intraoperative but also postoperative complications. In our opinion, the preserved apical part of the root of an intact tooth is less threatening than damage to the inferior alveolar nerve. Our proposed

methods have a reasonable justification and can serve as alternative methods to avoid damage to the inferior alveolar nerve during tooth extraction and its associated complications.

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